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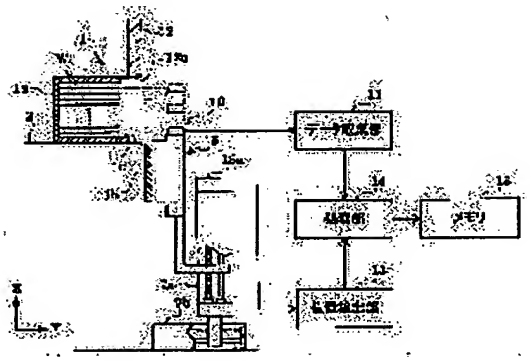
(71)Applicant : DAINIPPON SCREEN MFG CO LTD
(72)Inventor : IMANISHI YASUO
OTANI MASAMI
SHIBUKAWA JUN

(54) WAFER PROCESSOR

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a technology in a wafer processor for comprehending a condition of wafer accommodated within a cassette.
SOLUTION: A reflective sensor 10 is mounted to a shutter member 5 to cover a passage port 12a in a partition wall 12. The sensor 10 moving down integrally with the shutter member 5 sequentially detect wafers W within a cassette 1. A data processing unit 11 collects detection information on the wafers W. A position detection means, based on the information received from an encoder 13a provided to an elevator mechanism 7a, detects the position of the sensor 10. A processing unit 14, on the basis of the detection information of the wafers W and the position of the sensor 10, is capable of comprehending the condition of the substrates W within the cassette 1.



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* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] It is the substrate processor which processes by picking out a substrate from the cassette which contained two or more substrates in order. The installation section which lays the cassette by which the slot for having the ejection of a substrate and opening for containing and holding the contained substrate almost horizontally was formed two or more steps, Passage opening prepared in the septum with which the processing section which processes to said substrate, and said installation section and processing section are divided, The substrate processor characterized by having the shutter which opens and closes said passage opening, the shutter drive which drives [attitude-] and drives [rise-and-fall-] said shutter, and a detection means to detect the existence of the substrate which was attached in said shutter and contained by each slot of said cassette.
[Claim 2] It is the substrate processor which is the reflective mold sensor which consists of a floodlighting component arranged towards the end face of a substrate [in / on a substrate processor according to claim 1 and / in said detection means / near opening of said cassette], and a photo detector.
[Claim 3] It is the substrate processor which is the transparency mold sensor which consists of a floodlighting component by which opposite arrangement was carried out so that the substrate of said detection means in said cassette might be pinched near opening in a substrate processor according to claim 1, and a photo detector.
[Claim 4] After said detection is completed in it while making even the location close to opening of said cassette carry out advance actuation of said detection means in case said equipment detects the existence of said substrate further in a substrate processor according to claim 2 or 3, it is the substrate processor characterized by having the attitude drive which carries out retreat actuation of said detection means.
[Claim 5] It is the substrate processor which is an image pick-up means by which said detection means picturizes the inside of said cassette in a substrate processor according to claim 1.
[Claim 6] It is the substrate processor which consists of image pick-up means to be connected to the optical fiber with which said detection means was attached in said shutter in the substrate processor according to claim 1, and said optical fiber, and to picturize the inside of said cassette through this optical fiber.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the technique of picking out a substrate from the cassette which contains two or more substrates in order, and starting a necessary processing **** substrate processor, especially grasping the receipt condition of the substrate in a cassette.
[0002]
[Description of the Prior Art] Conventionally, there are some which were indicated by JP,3-297156,A as this kind of a substrate processor.
[0003] In this substrate processor, what is called an opening cassette is used as a cassette for containing two or more substrates. A substrate is formed in ejection and opening for containing, and opening smaller than said opening is prepared in the before [this opening cassette (it is only hereafter called a "cassette")] side at the back side of a cassette. Moreover, the slot for holding a substrate almost horizontally to the wall of a cassette is minced by multistage. One substrate is stored at a time in this slot, consequently two or more substrates are contained by the cassette.
[0004] A substrate processor performs predetermined processing to the substrate taken out from the specific slot in a cassette, and again, in order to contain this substrate into a specific slot, it grasps the receipt condition of the substrate in a cassette beforehand. Grasp of the receipt condition of this substrate is performed by the detection means formed in the installation section. This detection means is the transparency mold sensor which consisted of a floodlighting component by which opposite arrangement was carried out so that a cassette might be inserted from order, and a photo detector. This transparency mold sensor detects the existence of a substrate depending on whether it is the no by which transmission of light performed between a floodlighting component and a photo detector is intercepted. By making even the slot from a slot of the maximum upper case in a cassette on the bottom move this transparency mold sensor to up down one, the existence of the substrate contained in each slot on the cassette, i.e., the receipt condition of the substrate in a cassette, is grasped.
[0005]
[Problem(s) to be Solved by the Invention] However, new specification is fixed with enlargement of a substrate in recent years about the cassette which contains this substrate. The cassette according to this specification is called the FOUP (Front Open Unified Pod) cassette. Only the ejection of a substrate and single opening for containing are prepared, and this FOUP cassette has the composition that the removable lid was attached in this opening. At the time of the ejection and receipt of a substrate, a FOUP cassette is used, after the lid was removed and opening has opened, but since it has only single opening, there is a problem that the existence of the substrate contained by each slot on the cassette depending on the transparency mold sensor which sandwiches a cassette from order like before is undetectable.
[0006] This invention is made in view of such a situation, and aims at offering the substrate processor which can grasp the receipt condition of the substrate in a FOUP cassette.
[0007]
[Means for Solving the Problem] This invention takes the following configurations, in order to attain such an object. Namely, invention according to claim 1 is a substrate processor which processes by picking out a substrate from the cassette which contained two or more substrates in order. The installation

section which lays the cassette by which the slot for having the ejection of a substrate and opening for containing and holding the contained substrate almost horizontally was formed two or more steps, Passage opening prepared in the septum with which the processing section which processes to said substrate, and said installation section and processing section are divided, It is characterized by having the shutter which opens and closes said passage opening, the shutter drive which drives [attitude-] and drives [rise-and-fall-] said shutter, and a detection means to detect the existence of the substrate which was attached in said shutter and contained by each slot of said cassette.

[0008] Invention according to claim 2 is a reflective mold sensor which consists of a floodlighting component by which said detection means has been arranged towards the end face of the substrate in near opening of said cassette, and a photo detector in a substrate processor according to claim 1.

[0009] Invention according to claim 3 is a transparency mold sensor which consists of a floodlighting component by which opposite arrangement was carried out so that the substrate of said detection means in said cassette might be pinched near opening, and a photo detector in a substrate processor according to claim 1.

[0010] Invention according to claim 4 is characterized by to equip it with the attitude drive which carries out retreat actuation of said detection means further, after said detection was completed in it, while making even the location close to opening of said cassette carry out advance actuation of said detection means when said equipment detects the existence of said substrate in a substrate processor according to claim 2 or 3.

[0011] Invention according to claim 5 is an image pick-up means by which said detection means picturizes the inside of said cassette, in a substrate processor according to claim 1.

[0012] It consists of image pick-up means by which said detection means is connected to the optical fiber attached in said shutter, and said optical fiber in a substrate processor according to claim 1, and invention according to claim 6 picturizes the inside of said cassette through this optical fiber.

[0013]

[Function] The operation of invention according to claim 1 is as follows. In case a substrate is picked out from a cassette, retreat actuation of the shutter is carried out and passage opening can open. Then, downward actuation of the shutter is carried out even in the location which does not become the obstacle of the ejection and receipt of the substrate from a cassette. It is united with retreat of this shutter, and downward actuation, and a detection means also retreats and descends. If a shutter begins to carry out downward actuation, a detection means will begin to detect the existence of the substrate contained through passage opening by the slot on the cassette. Since a shutter descends even to the location which does not become the obstacle of the ejection and receipt of the substrate from a cassette, a detection means carries out sequential detection of the existence of the substrate contained from the maximum upper case of a cassette by all the slots on the bottom.

[0014] According to invention according to claim 2, it is reflected by the end face of the substrate, and the light floodlighted from the floodlighting component of a reflective mold sensor is received by the photo detector, when Mizouchi of a cassette has a substrate. On the other hand, when there is no substrate, the floodlighted light is not received by the photo detector. The existence of light-receiving by this photo detector detects the existence of the substrate in each slot on the cassette.

[0015] When Mizouchi of a cassette has a substrate according to invention according to claim 3, since the light floodlighted from the floodlighting component of a transparency mold sensor is intercepted with Mizouchi's substrate, it is not received by the photo detector. On the other hand, when there is no substrate, the floodlighted light is received by the photo detector. The existence of light-receiving by this photo detector detects the existence of the substrate in each slot on the cassette.

[0016] According to invention according to claim 4, in case the existence of the substrate in each slot on the cassette is detected, an attitude device carries out advance actuation of the detection means even near the opening of a cassette. A detection means detects the existence of the substrate in each slot [near the opening of a cassette] in this condition. After detection of a substrate is completed about all the slots in a cassette, an attitude device carries out retreat actuation of the detection means.

[0017] According to invention according to claim 5, with descent of said shutter, an image pick-up means is picturizing the inside of a cassette, and detects the existence of the substrate in each slot on the cassette.

[0018] According to invention according to claim 6, through the optical fiber attached in this shutter, an image pick-up means is picturizing the inside of a cassette, and detects the existence of the substrate in each slot with descent of a shutter.
[0019]
[Embodiment of the Invention] Hereafter, the example of this invention is explained with reference to a drawing. Drawing 1 is the top view showing the outline configuration of the important section of the substrate processor concerning the example of this invention. Drawing 2 is the side elevation. In addition, the substrate processor of this example is a substrate processor corresponding to the cassette by which the substrate is attached in the lid by ejection and opening for containing currently called the FOUP (Front Open Unified Pod) cassette.
[0020] As shown in drawing 1 , this substrate processor picks out Substrate W from a cassette 1, and the processing section 20 which performs predetermined processing to this substrate W, and the installation section 3 which lays a cassette 1 are separated by the septum 12, and it is constituted. The cassette stage [two or more (this example four pieces)] 2 in which a cassette 1 is laid is established in the installation section 3.
[0021] As shown in drawing 3 , the FOUP cassette 1 (it is hereafter called "a cassette 1") consists of lid 1b inserted in opening 1c with which container 1a and this container 1a for containing Substrate W are equipped removable. 1d of slots on multistage is countered and established in the wall of container 1a. Substrate W is contained in the condition of having been held almost horizontally by 1d of each slot. When inserted in opening 1c of container 1a, fixed device 1e which fixes lid 1b to container 1a is laid under the lid 1b. This fixed device 1e consists of pinion 1g which gears with 1f of two lock members by which the rack was engraved on the end face section on a rack and which can be rotated. According to the lock device 6 with which the shutter member 5 mentioned later is equipped, by rotating pinion 1g near the center of lid 1b, 1f of lock members is raised and lid 1b is fixed to opening 1c of container 1a.
[0022] In order to detect that the cassette 1 was laid in the cassette stage 2, the cassette detection means which is not illustrated [sensor / reflective] is formed in the installation side of a cassette 1. moreover, the cassette stage 2 -- the cassette drive 4 formed caudad -- septum 12 direction (the direction of Y) -- an attitude -- it is constituted movable.
[0023] The cassette drive 4 is constituted by the so-called screw delivery device in which screw-axis 4b screwed in heights 2a prepared in the underside of the cassette stage 2 is driven by electric motor 4a. If a cassette 1 is laid in the cassette stage 2, electric motor 4a will carry out the forward revolution of the screw-axis 4b, and will advance the cassette stage 2 toward a septum 12. In addition, after processing of all the substrates W of a cassette 1 is completed, electric motor 4a carries out counterrotation of the screw-axis 4b, and retreats the cassette stage 2.
[0024] Passage opening 12a of the almost same magnitude as a cassette 1 is prepared in the location which counters a cassette 1 at the septum 12. This passage opening 12a is for performing the ejection and receipt of Substrate W from a cassette 1, and when the cassette 1 is not laid, in order to cover the ambient atmosphere of the processing section 20 and the installation section 3, it is closed by the shutter member 5.
[0025] As shown in drawing 4 , the shutter member 5 consists of heights 5a inserted in passage opening 12a of a septum 12, and support plate section 5b in which this heights 5a is prepared. The electric motor which is not illustrated and connection member 6a connected with the output shaft of this electric motor are laid under the heights 5a.
[0026] Since lid 1b of a cassette 1 is moved even to the location close to heights 5a of the shutter member 5 by advance actuation of the cassette stage 2 mentioned above, connection connection of the pinion 1g of lock device 1e with which lid 1b was equipped is made by it at connection member 6a. In this condition, the lock device 6 with which the shutter member 5 was equipped rotates an electric motor, is canceling the lock of lid 1b and container 1a, and enables balking of lid 1b from container 1a.
[0027] Moreover, "L" character type arm 5c prolonged below is prepared in support plate section 5b mentioned above (refer to drawing 2). The shutter member 5 is considered as an attitude and rise-and-fall actuation by the shutter drive 7 attached in the end face section of this arm 5c.
[0028] The shutter drive 7 consists of elevator style 7a which makes a Z direction go up and down the shutter member 5, and attitude device 7b which makes it move in the direction of Y. Elevator style 7a is constituted by the so-called screw delivery device in which the screw axis screwed in the end face

section of arm 5c is driven with an electric motor. Moreover, encoder 13a is prepared in the upper part of elevator style 7a, and the location of the Z direction of the shutter member 5 is detected by detecting the rotation of an electric motor. Attitude device 7b consists of screw delivery devices in which elevator style 7a is made to move in the direction of Y. By elevator style 7a and attitude device 7b, an attitude and rise and fall of the shutter member 5 are attained. Hereafter, with reference to drawing 5 (a) and (b), actuation of the shutter member 5 is explained concretely.

[0029] As shown in drawing 5 (a), advance actuation of the cassette 1 laid in the cassette stage 2 (refer to drawing 2) is carried out by the cassette drive 4 (refer to drawing 2). At this time, the shutter member 5 has closed passage opening 12a. If a cassette 1 moves even to the location close to the shutter member 5 as shown in drawing 5 (b), the shutter member 5 will hold this lid 1b according to the lock device 6 (refer to drawing 4) while canceling the lock of lid 1b of a cassette 1. Next, after retreat actuation is carried out by the shutter drive 7, downward actuation of the shutter member 5 is carried out even in the evacuation location which does not become the ejection of the substrate W from a cassette 1, and the obstacle of receipt. It stands by in an evacuation location until processing of all the substrates W of this cassette 1 is completed. After processing of all the substrates W of a cassette 1 is completed, the shutter member 5 attaches lid 1b in a cassette 1 while advance actuation is carried out and it closes passage opening 12a, after lifting actuation is carried out.

[0030] As further shown in drawing 4 , the reflective mold sensor 10 which consists of floodlighting component section 10a and photo detector section 10b is attached in the upper part of supporter material 5b at the shutter member 5 mentioned above. In case the shutter member 5 descends, this floodlighting component section 10a and photo detector section 10b are attached so that the point P on the end face of the substrate W contained by 1d of slots of a cassette 1 may be turned to. Therefore, it reflects the point P on the end face of the substrate W contained by 1d of slots of a cassette 1, and this reflected light is received by photo detector section 10b, and the light floodlighted from this floodlighting component section 10a is changed into an electrical signal. That is, the existence of the substrate W contained in 1d of slots can be known by detecting whether an electrical signal occurs in photo detector section 10b.

[0031] As shown in drawing 6 , the reflective mold sensor 10 is connected with the data collection section 11. The data collection section 11 collects the electrical signals by which photo electric translation was carried out based on the reflected light received by photo detector section 10b of the reflective mold sensor 10. In the data collection section 11, while the shutter member 5 is carrying out downward actuation, collection of an electrical signal is performed. The location detecting element 13 detects the location of the reflective mold sensor 10 attached in the shutter member 5 based on the rotation signal of the electric motor sent from encoder 13a attached in elevator style 7a of the shutter drive 7. The processing section 14 memorizes the existence of the substrate W in each slot location of a cassette 1 in memory 15 while asking for the existence of the substrate W in each slot in a cassette 1 from the electrical signal brought together in the location and the data collection section 11 of the reflective mold sensor 10 detected by the location detecting element 13.

[0032] If descent of the shutter member 5, i.e., descent of the reflective mold sensor 10, starts, specifically, the data collection section 11 will start collection of the electrical signal generated in photo detector section 10b while floodlighting light from floodlighting component section 10a of the reflective mold sensor 10. First, when it comes to the transverse-plane location whose reflective mold sensor 10 is 1d of slots of the maximum upper case of a cassette 1 by descent of the reflective mold sensor 10 and Substrate W is contained by 1d of slots of this maximum upper case, the light floodlighted from floodlighting component section 10a reflects on the end face of that substrate W. In photo detector section 10b, photo electric translation of the received reflected light is carried out, and an electrical signal occurs. Furthermore, in photo detector section 10b, the reflected light is not received and the reflective mold sensor 10 does not generate an electrical signal, when it comes to the transverse-plane location whose reflective mold sensor 10 is 1d of the 2nd step of slots in a cassette 1 since it descends next and Substrate W is not contained by 1d of the 2nd step of slots. These electrical signals collect and the data collection section 11 is continued until descent of a reflective mold sensor is completed. The mimetic diagram showing the relation of the electrical signal and time amount progress which are collected in this data collection section 11 is shown in drawing 7 (a). A sign 70 shows each signal when Substrate W is detected among drawing.

[0033] On the other hand, the location detecting element 13 can grasp the location of the reflective mold sensor 10 based on the rotation of the electric motor sent from encoder 13a prepared in elevator style 7a from the initial position and the amount of descent of the reflective mold sensor 10. The location detecting element 13 detects time amount while having passed through the location where the reflective mold sensor 10 meets 1d of each slot of a cassette 1. The mimetic diagram showing the time amount which passes through the location which meets 1d of this slot is shown in drawing 7 (b). A sign 71 shows among drawing time amount while having passed through the location which meets 1d of slots of a cassette 1. A sign 72 shows the number of 1d of slots. 1d of this slot sets to "1" 1d of slots through which it passes first, and the slot on subsequent has become "2", "3", ..., "25" at sequence. Here, since a cassette 1 can contain 25 substrates W, the number of the last of 1d of slots is "25."
[0034] The processing section 14 asks for the existence of the substrate W in 1d of each slot by logical operation for every time amount of 1d of each slot based on the time amount which passes through the location which is detected by the location detecting element 13, and which meets 1d of each slot, and the information on the existence of the substrate W in the time amount progress collected in the data collection section 11. The processing section 14 memorizes this result in memory 15. Thus, the receipt condition of the substrate W in a cassette 1 can be grasped.
[0035] The information on the existence of the substrate W for 1d of every slots memorized by this memory 15 is used by the controller which controls the substrate processor which is not illustrated. For example, the controller operated the substrate conveyance device 9 mentioned later based on the information on this memory 15, and after processing of the substrate W taken out from the specific slot of a cassette 1 is completed, when carrying out return receipt to the specific slot which took out that substrate W, it is used.
[0036] A substrate processor starts the ejection and receipt of Substrate W from a cassette 1 according to the substrate conveyance device 9, after grasping the receipt condition of the substrate W in a cassette 1.
[0037] The substrate conveyance device 9 is equipped with arm 9a holding Substrate W. Although this maintenance arm 9a is the character type configuration of "I" as shown in drawing 1 , it may be the character type configuration of "U", for example. This arm 9a is equipped with two or more support pins which support the underside of Substrate W by point contact and which are not illustrated, and in order to prevent omission, location gap, etc. of the substrate W under conveyance, the member which carries out point contact is prepared around Substrate W.
[0038] The substrate conveyance device 9 is constituted as follows. the screw delivery device in which arm 9a was arranged by arm susceptor 9b as shown in drawing 1 and drawing 2 — the inside of the level surface — an attitude — it is constituted movable. Next, connection support of the arm susceptor 9b is carried out at the output shaft of the electric motor built in arm revolution base 9c. By revolution of this electric motor, arm 9a becomes pivotable in the level surface. Furthermore, arm revolution base 9c is constituted possible [rise and fall] by 9d of elevator styles which consisted of screw delivery devices. 9d of moreover, elevator styles — the direction of X within the level surface — a slide — it is carried in movable slide drive 9e.
[0039] By the configuration mentioned above, arm 9a operates as follows. Slide migration device 9e makes even the location which counters the predetermined cassette 1 laid in the installation section 3 carry out slide migration of the arm 9a. In order to take out the substrate W of the maximum upper case in a cassette 1, after raising arm 9a, making even the underside of Substrate W carry out advance migration of the arm 9a further and holding Substrate W on arm 9a, arm 9a is retreated and Substrate W is picked out from a cassette 1. Slide migration device 9e delivers Substrate W for arm 9a to the substrate carrier robot of equipment which is made to move even near a center mostly and the processing section 20 does not illustrate. After processing of the substrate W in the processing section 20 is completed, the substrate conveyance device 9 contains Substrate W from the substrate carrier robot of the processing section 20 in reception and the cassette 1 which took out the substrate W again. This processing is performed to all the substrates W of a cassette 1.
[0040] If processing of all the substrates W of a cassette 1 is completed and all the substrates W are contained by the cassette 1, after lifting actuation is carried out, advance actuation is carried out, and the shutter member 5 closes passage opening 12a, operates the lock device 6, and fixes lid 1b to container 1a of a cassette 1. If lid 1b is fixed to container 1a, with a cassette drive 4, the cassette stage

2 will carry out retreat migration, and will be moved even to a cassette picking raising location.
[0041] The substrate processor mentioned above attaches in the upper part of the shutter member 5 the reflective mold sensor 10 which is a detection means, and since it detects the existence of the substrate held with descent of the shutter member 5 in 1d of each slot of a cassette 1, it does not need a drive which makes it go up and down only a detection means. Therefore, lifting of the manufacturing cost of equipment by attaching a detection means can be suppressed to the minimum. Moreover, a detection means can be easily attached using the configuration with which equipment is equipped.
[0042] This invention can also carry out deformation implementation as follows.
[0043] (1) Although the reflective mold sensor was used in the above-mentioned example as a detection means to detect the existence of the substrate W contained by 1d of each slot of a cassette 1 in order to grasp the receipt condition of the substrate W in a cassette 1, this invention cannot be limited to this and the transparency mold sensor equipped with an attitude drive instead of this reflective mold sensor 10 can also be attached. The configuration at the time of attaching this transparency mold sensor is shown in drawing 8 .
[0044] As shown in drawing 8 , the attitude drive 81 and the transparency mold sensor 80 attached possible [the attitude actuation to this attitude drive 81] are arranged in the upper part of support plate section 5b of the shutter member 5. The attitude drive 81 is constituted by the so-called screw delivery device in which screw-axis 81b screwed in connection member 81c is driven by electric motor 81a.
[0045] The transparency mold sensor 80 consists of floodlighting member 80a which equips a point with floodlighting component 83a, and light sensing portion material 80b which equips a point with photo detector 83b, and support immobilization of the end face section of both [these] the members 80a and 80b is carried out at connection member 81c. Furthermore, while advice support of the sliding is enabled by penetrating holddown-member 82a and holddown-member 82b, respectively, height is shifted up and down and opposite arrangement of floodlighting member 80a and the light sensing portion material 80b is carried out.
[0046] Hereafter, actuation when this transparency mold sensor 80 and the attitude drive 81 are attached in the shutter member 5 is explained. By descent of the shutter member 5, if the transparency mold sensor 80 comes to the transverse-plane location of the upper bed section of a cassette 1, the attitude drive 81 will drive electric motor 81a, and will advance connection member 81c. It is united with this connection member 81c, and floodlighting member 80a and light sensing portion material 80b move forward toward between the inner surface of the side attachment wall of a cassette 1, and Substrates W. The attitude drive 81 will stop actuation of electric motor 81a, if the point of floodlighting member 80a and light sensing portion material 80b comes even to a position. This location is a location where the optical axis of the transparency mold sensor 80 is intercepted by Substrate W, when Substrate W is in 1d of slots of a cassette 1. The transparency mold sensor 80 is in the condition that this location was held, and detects the existence of the substrate W in 1d of each slot of a cassette 1 one by one according to descent of the shutter member 5. The timing of detection of this substrate W is the same as that of the case of the above-mentioned example which used the reflective mold sensor.
[0047] If the transparency mold sensor 80 comes to the transverse plane of the bottom of a cassette 1, the attitude drive 81 will drive electric motor 81a to hard flow, and will retreat connection member 81c. If the point of floodlighting member 80a and light sensing portion material 80b retreats even to holddown members 82a and 82b, the attitude drive 81 will stop actuation of electric motor 81a. It is for making it floodlighting member 80a and light sensing portion material 80b not caught in the installation section 3 etc. to retreat floodlighting member 80a and light sensing portion material 80b, when the shutter member 5 descends.
[0048] Since the transparency mold sensor 80 which is a detection means can be brought close to Substrate W and the existence of Substrate W can be detected with the attitude drive 81 mentioned above, detection precision can be improved. In addition, make the reflective mold sensor explained in the example mentioned above ** with the above-mentioned attitude drive 81 approximately, a reflective mold sensor is made to approach a substrate, and you may make it detect the existence of a substrate.
[0049] (2) The CCD camera which limits to neither a reflective mold sensor nor a transparency mold sensor, and picturizes the inside of a cassette 1 is sufficient as a detection means to detect the existence of the substrate W contained by 1d of each slot of a cassette 1.

[0050] For example, as shown in drawing 9 , CCD camera 90 is laid in the upper part of support plate section 5b of the shutter member 5. This CCD camera 90 continues and picturizes the inside of a cassette 1, while the shutter member 5 descends. The image data of the cassette 1 obtained by this image pick-up is collected by the data collection section 11. The processing section 14 performs binary-ized processing to this image data, and grasps the receipt condition of the substrate W of a cassette 1. In addition, CCD camera 90 is equivalent to the image pick-up means in this invention.
[0051] If it is made the configuration mentioned above, since the inside of a cassette 1 can be regarded as an image, the condition of a substrate can be further grasped in a detail.
[0052] (3) In order to grasp the receipt condition of the substrate W in a cassette 1, CCD camera 90 was used, but an optical fiber 95 may be installed in the upper part of support plate section 5b of the shutter member 5, and as shown in drawing 10 , the CCD camera which was connected to the termination of this optical fiber 95 and which is not illustrated may constitute from the above-mentioned modification (2), for example so that the inside of a cassette 1 may be picturized.
[0053] If it is made the configuration mentioned above, since a CCD camera can be installed in the location which **ed in equipment, amplification of the equipment by establishing a detection means can be prevented. Moreover, since an optical fiber is light, it does not affect actuation of the shutter member 5. In addition, it is made to ** approximately with the attitude drive 81 as showed CCD camera 90 mentioned above and the optical fiber 95 to drawing 8 , and you may make it picturize the inside of a cassette, where a substrate is approached.
[0054]
[Effect of the Invention] Since the detection means was attached in the shutter which opens and closes passage opening prepared in the septum with which the installation section and the processing section are divided according to invention according to claim 1 so that clearly from the above explanation, the receipt condition of the substrate in a FOUP cassette can be grasped by descent of a shutter. Moreover, since the same drive system as a shutter is used, it can process efficiently and reduction of the manufacturing cost of equipment can also be aimed at. Furthermore, hypertrophy of the installation area of the equipment accompanying installation of a detection means can also be prevented.
[0055] According to invention according to claim 2, since the reflective mold sensor is used as a detection means, reduction of the manufacturing cost of equipment can be aimed at. Moreover, since a reflective mold sensor is small, it can be easily attached in a shutter.
[0056] According to invention according to claim 3, since the transparency mold sensor is used as a detection means, the existence of the substrate in each slot on the cassette is detectable to accuracy.
[0057] Since the attitude drive is moving the detection means even near opening of a cassette according to invention according to claim 4, a detection means becomes possible [detecting a substrate by the cassette in a near location]. Therefore, the substrate in each slot on the cassette is more detectable to accuracy.
[0058] According to invention according to claim 5, since the image pick-up means is used as a detection means, the receipt condition of the substrate in a cassette can be regarded as an image. Therefore, the receipt condition of the substrate in a cassette can be grasped more to accuracy.
[0059] Since the optical fiber connected to the image pick-up means is attached in the shutter according to invention according to claim 6, deciding freely comes out of the installation of an image pick-up means. Therefore, space-saving-ization of equipment can be attained by installing an image pick-up means in the location which **ed in equipment.

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DESCRIPTION OF DRAWINGS

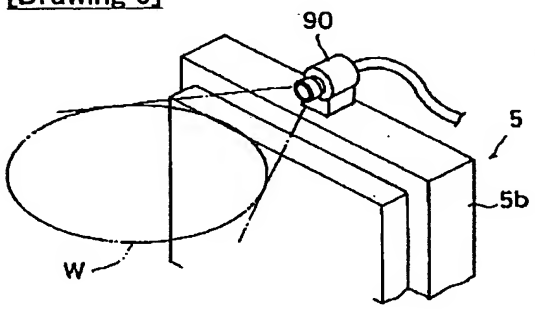
[Brief Description of the Drawings]
[Drawing 1] It is the top view showing the outline configuration of the substrate processor concerning the example of this invention.
[Drawing 2] It is the side elevation showing the outline configuration of the equipment concerning an example.
[Drawing 3] It is the perspective view showing the FOUP cassette of an example.
[Drawing 4] It is the perspective view showing the reflective mold sensor attached in the shutter member and shutter member of an example.
[Drawing 5] It is an outline side elevation showing actuation of the shutter member of an example.
[Drawing 6] It is the block diagram showing the important section of an example.
[Drawing 7] It is the mimetic diagram showing the slot location of detection of the substrate of an example, and a cassette.
[Drawing 8] It is the perspective view showing the condition that the transparency mold sensor concerning a modification (1) was attached in the shutter member.
[Drawing 9] It is the perspective view showing the condition that the CCD camera concerning a modification (2) was attached in the shutter member.
[Drawing 10] It is the perspective view showing the condition that the optical fiber concerning a modification (3) was attached in the shutter member.
[Description of Notations]
1 -- Cassette
2 -- Cassette Stage
3 -- Installation Section
4 -- Cassette Drive
5 -- Shutter Member
6 -- Lock Device
7 -- Shutter Drive
9 -- Substrate Conveyance Device
10 -- Reflective Mold Sensor
11 -- Data Collection Section
12 -- Septum
12a -- Opening
13 -- Location Detecting Element
14 -- Processing Section
15 -- Memory
80 -- Transparency Mold Sensor
81 -- Attitude Drive
90 -- CCD Camera
95 -- Optical Fiber
W -- Substrate

* NOTICES *

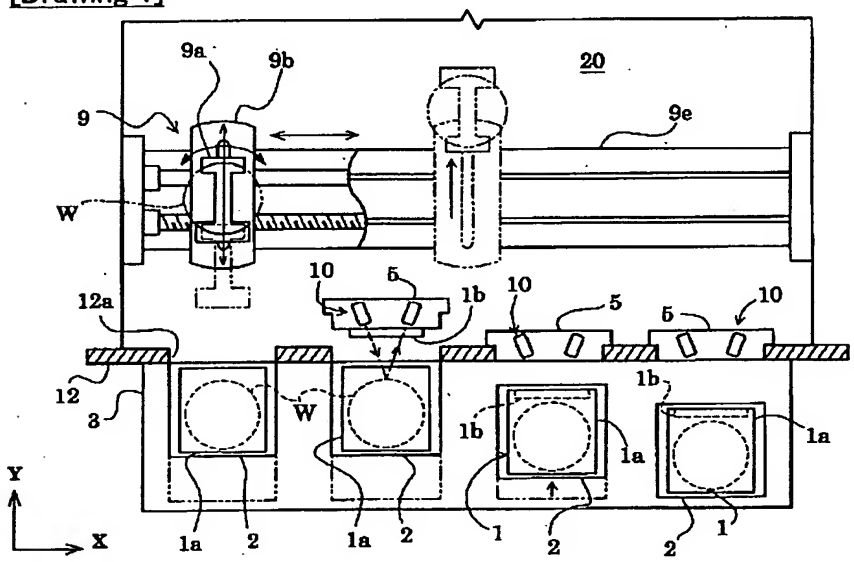
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

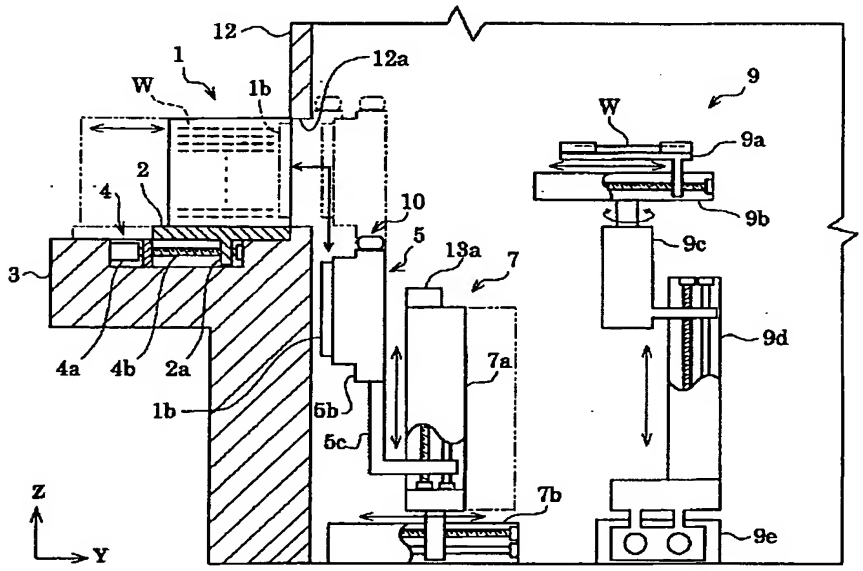
[Drawing 9]



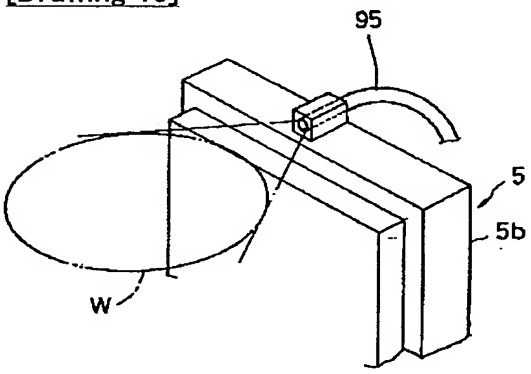
[Drawing 1]



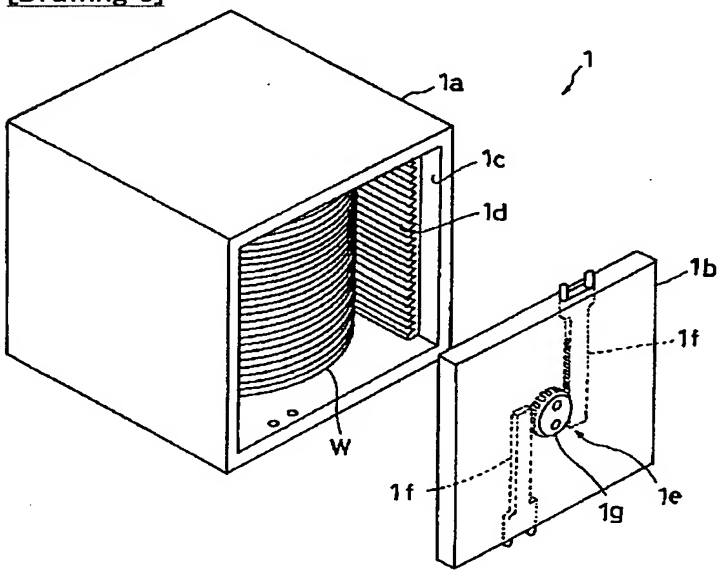
[Drawing 2]



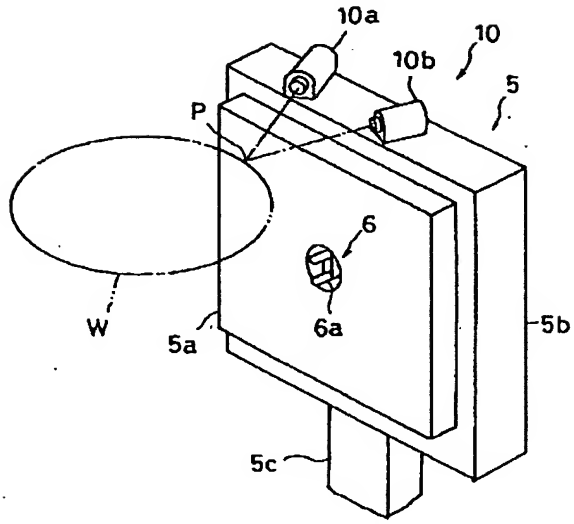
[Drawing 10]



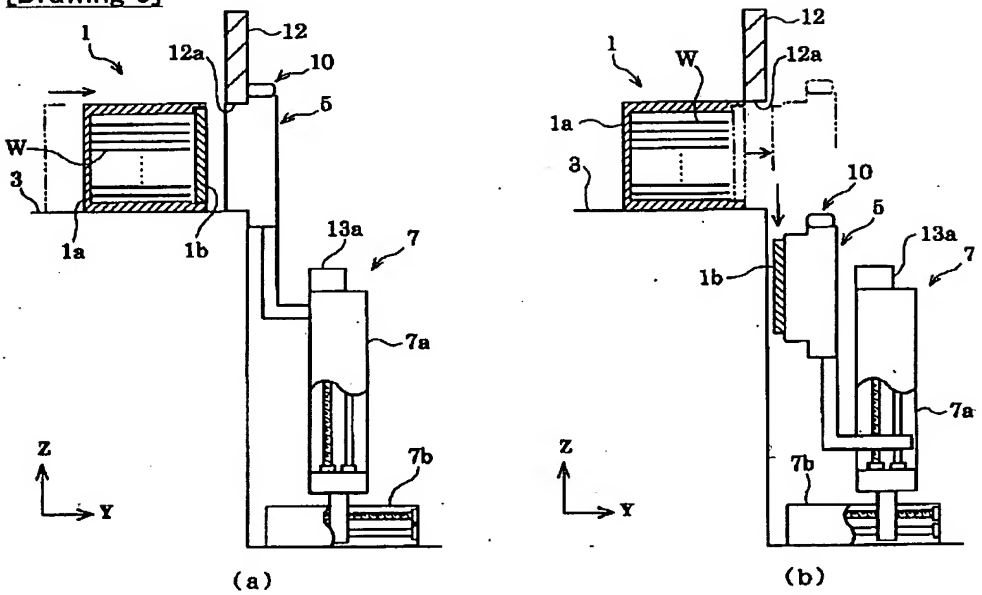
[Drawing 3]



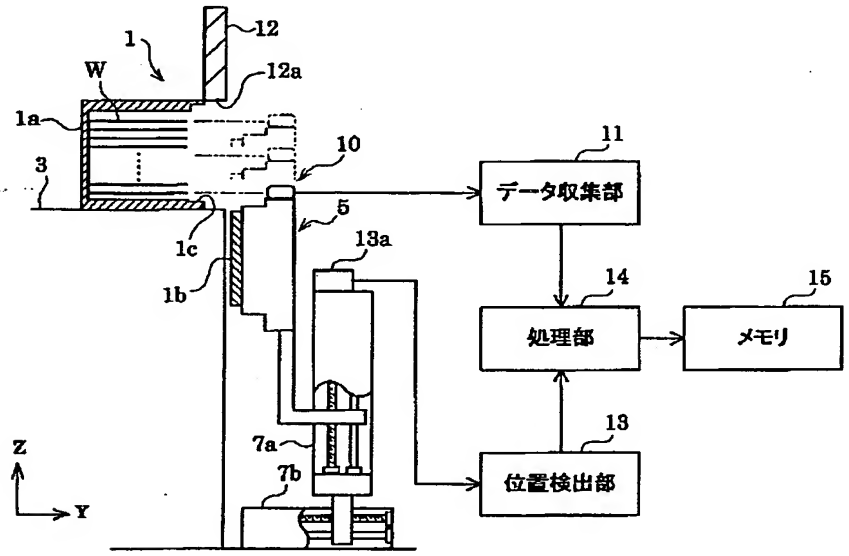
[Drawing 4]



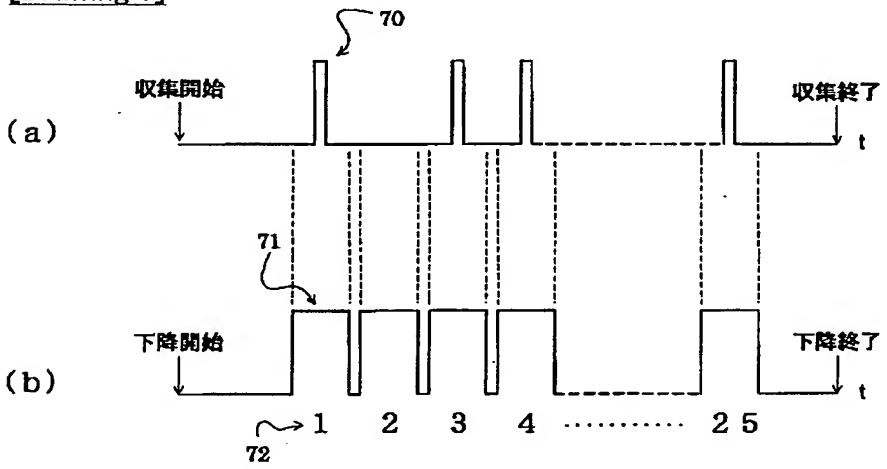
[Drawing 5]



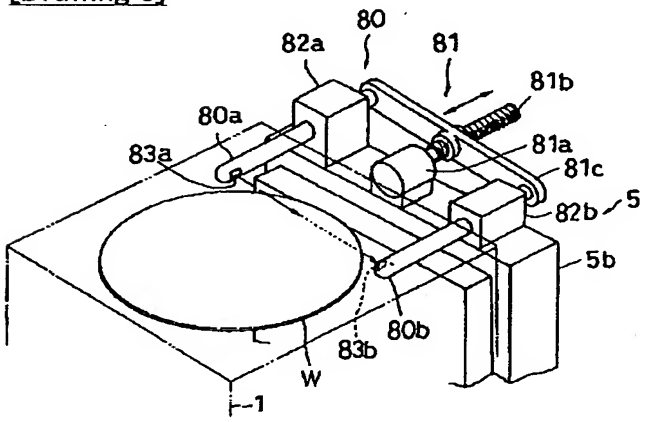
[Drawing 6]



[Drawing 7]



[Drawing 8]



[Translation done.]